Iowa Science Teachers Journal

Volume 2 | Number 4 Article 6

1965

Teaching Slow Learners in Biology

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TEACHING SLOW LEARNERS IN BIOLOGY

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The recurrent question of capacity development for the individual student brings with it the annual problem of helping the slow learner achieve in accordance with his ability. There are primarily five areas of techniques which should be considered when dealing with the slow learner in biology. Application of techniques in these areas will be suggested for groups with I.Q. ranges from approximately 70-85. The areas covered will be:

Sister Placid

(1) psychology techniques
(2) audio techniques
(3) visual techniques
(4) text requirements
(5) laboratory techniques

Psychological Techniques

It is essential that any teacher who contemplates working with the slow learning groups likes her work with these below average students, and also likes them as individuals. These pupils are quick to feel whether they, as individuals, are liked or merely tolerated. Anyone without a deep understanding of and constructive sympathy for them should never attempt to work with them.

Appreciation of any progress, any correct answer, and any reasonable attempt is essential in making these pupils build up within themselves a sense of adequacy in meeting situations. They readily understand that they may not accomplish as much as normal pupils in their subject, but they need the assurance that what they are doing is worth while, and that they are learning to a degree that is adequate for their needs. In this regard, the old saying that, "Nothing succeeds like success," is the biggest help to the teacher and pupil, even though that success may be far below the level ordinarily met by pupils at that grade level. It is to be noted primarily that the pupil be allowed to produce at his level, and not blamed for not producing at some more mature pupil's level.

Audio Techniques

Repetition is an absolute necessity for those whose mental ability to grasp an idea in the first place is often handicapped even more by the lack of mental retention. The technique involves (a) explanation of basic material so that it is first thoroughly understood, (b) repetition of basic material: here it has been found that short drill periods of 5 to 10 minutes furnish concrete unification of the important facts. Since lower I.Q. students find it difficult to differen-

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tiate major ideas from minor ones, it is usually necessary for the teacher to knit together the various parts into a whole, prior to the repetition by pupils, singly and as a group. This will prepare pupils for step (c) individualized study of the basic material, which the pupils can now evaluate as to its relative importance.

A study of wasps gets a lift from real life samples donated by the pupils.

Participation of pupils in the presentation of new ideas by building from known to unknown enhances interest. Hearing their peers talking about their experiences, asking questions about the material, or giving reports is often more effective than the explanations of a teacher, because it contains a natural interest stimulation. Questions on the part of the teacher can easily clarify any misconcepts that may occur, (and they will!).

Visual Techniques

Ability to capitalize on the pupil's potential for collecting specimens related to the class work is of major importance, because these pupils usually are much less inhibited than the normal pupils in bringing specimens to class. Because of their mental inability, these students often are more observant of physical surroundings. Interesting items are often overlooked by normal pupils simply because they have seen them and have become used to their presence, whereas, the slower student notices these items for the first time and utilizes them immediately after his attention has been alerted to them. Once the spirit of mutual appreciation has been established in a class, (and these pupils are most tolerant of one another, if the teacher is) their natural urge to share, to "show what they found", can bring excellent results.

Large, uncomplicated charts to guide the pupils in doing laboratory work are very helpful. Since the pupils' experiences in interpretation of new material is limited, it is important that they have some type of guide to help them see what they are invstigating and what they might expect to find. They have quite good ability to recognize physical data and can help themselves fairly well with a clear guide.

Relative to identification helps, the use of projector slides to present the material to be recognized, especially under microscope, is very valuable. One of the most difficult problems of these pupils is knowing what they are looking for. However, they are quite adept in finding it once they have been given some visual representation of the physical properties of the specimen. A mere verbal description, much less a written description, does not suffice in most cases.

Films have been found very beneficial in this regard, especially if presented as an introduction to the new material. The pupils then have a general concept of what is being talked about, and the combination of the audio-visual helps much to impress a mental picture upon them. It is important that the teacher keep in mind constantly that these pupils must deal almost completely in a sensory representation to themselves of the subject studied. Therefore, any general concepts learned must come from an aggregation in the pupil's mind of many specifics, as seen, heard, felt, or otherwise received through the senses. Deriving specifics from generalities is very difficult for these pupils—they usually learn only from a

physical sense, not from mental deductions by comparisons, unless guided directly by the teacher in these processes. One of the major concepts difficult for these pupils to grasp is consequential or cause-effect developmental series. They can usually grasp sequential development once it is explained, but they need to be able to watch the living process of cause-effect relationship before it has significance for them. Films can do this very effectively. Preference should be given to films which show life processes of actual organisms as correlated with the diagramatic representations, rather than the animation cartoons or make-believe characters. Once the film descends to the recreational, these students are likely to miss the academic message mainly because of their inability to distinguish adequately the details from major ideas.

Text Requirements

Simple vocabulary of reading level corresponding to fifth, sixth or seventh grade is necessary. This means deleting many of the scientific terms without destroying the basic biological concept to be mastered. Before a slow group is subjected to reading material, the teacher should have on hand statistics to show the general level of the group, and any assigned readings (whether in or beyond the text) should be subjected to that norm.

Examples of twig grafting help the students visualize this important method of plant propagation.

Well organized and pointedly obvious sequential and cause-effect relationships are invaluable. It is difficult enough for the child to master these without having to organize them himself.

Picture charts are helpful in developing a scientific vocabulary. Such items as classification groups showing representative organisms and captioned pictures of the structural characteristics of each group make this part much more effective. Always, stress must be made on associating the correct term with the proper item, or again the chart becomes merely a jumble of pictures, interesting, but of no organized significance to these pupils.

For the teacher of these pupils, as well as the pupils themselves, a well-organized home-work assignment at the end of each section is a great boon. These pupils seldom can effectively organize their own study; but if given a thorough guide, they can be taught to follow through, recheck, and carry out a self-disciplined study period. For the teacher to organize this for every day's assignment for a number of classes becomes an almost impossible task, so most teachers will be grateful for and use effectively a well-rounded set of exercises at the end of each day's or even two days' content material. These assignments should have as aims: vivifying the pictorial concept of the content studied; making of diagrams (even if it be only to reproduce the one from the text) to impress the details of the subject; executing free hand drawings of the specimens used in class so as to require closer scrutiny; gathering pictures of the various organisms showing the life processes to pinpoint the process for that particular organism; collecting of easily obtainable specimens to alert the pupil to his own environmental possibilities and create the family interest so neces-

sary to build the social security and approval which stimulates learning.

Problem solving for these pupils must be kept on a physically observable basis. Abstractions, generalizations or intellectually involved deductions should be avoided. Uncomplicated "Why" problems, "How" problems, "When" problems which are based on physicalphenomena can be handled because of the concreteness of the material involved. Comparisons of physical charactristics and follow through of sequential and uncomplicated cause-effect relationship problems of a physical nature are good. A simple example of this is exemplifying variation within a species by counting and graphing the segments found on earthworm specimens used in several classes.

Laboratory Techniques

Laboratory procedure particularly must be built in accordance with the above ideas of guided problem solving. The teacher should include thought problems to be solved in the dissecting process, but she must be the guiding factor in presenting the problem, and seeing that the pupils follow through to find the answer. If the answer is beyond their ability, or cannot seem to be grasped, more direct questions should be used, until the problem has been given one or more possible solutions. These pupils are not intellectually able to continue research on their own. Success in problem solving is necessary and need not be done in such a way that the pupils get the idea that no other possible solution can be acceptable. The idea to be stressed here is that much of the perserverance toward success must be teacher stimulated because of the lack of ability on the part of the slow pupil to initiate this more advanced and self-disciplined type of investigation.

Specific laboratory techniques which these pupils handle well are:

1. Microscope manipulation (such as, cleaning, light adjustment, exploration of slides for location of specific items, magnification changes, selection of possible and/or best magnification) can be handled well by these pupils after several sessions of indvidualized help subsequent to introduction of each of the techniques to the group as a whole.

2. After specific directions as to how to select and ready the particular specimen, pupils should be expected to make their wet-slide preparation without repeating the directions each time.

3. With teacher direction, these pupils can do the physical manipulation necessary for practically any of the usual dissections handled by normal classes. They find difficulty in applying the technical scientific terms to the dissected items, but readily correlate common terms with the designated specimen.

4. Staining processes with basic stains can be mastered by these students. Frequent use of iodine stain is recommended at first, then introduction of other stains.

5. These pupils find it very interesting to see what comparison there is between their specimen and that of others; and the learning that accrues from this is good. However, because the attention span and tenacity of purpose is as immaturely developed as other qualities in these pupils, the teacher must constantly maintain a "restricted freedom" in this regard, and provide the stabilizing impetus toward a solving of the indicated problem.

6. Identification is necessarily dependent on clear-cut, uncomplicated classification data. These criteria may be worked out by the pupils under teacher guidance, or by the teacher, if the time loss would not be proportional to the learning done. But in either case, the criteria must be very explicit. These pupils have enough things which cause them confusion! Often the simple recognition of a structural difference when pointed out is difficult enough, without expecting a discovery of that difference by the pupil.

It is by the application of these basic principles in psychological techniques, audial techniques, visual techniques, text requirements, and laboratory techniques that a teacher can hope for success in his work with the slow learners in biology.